# A Varactor Controlled 900 MHz Body-Wearable Antenna Array

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Body-wearable antennas and antenna arrays are of significant interest to support high speed data communications. The relatively large surface area on the chest or the back can be utilized to form antenna arrays. Particularly such arrays are of interest for applications concerning fire fighters, law enforcement personnel, astronauts, and military personnel.

Beam steering can be achieved with the help of either a phased array or a parasitic array. The latter being more attractive because compressed low-cost arrays can be developed which can be controlled using PIN diodes, varactors etc. At higher frequencies, e.g. 2 GHz and higher gain can be achieved. But even at low frequencies such as 900 MHz, beam shaping can be advantageous in a multi-path fading environment.

In [Md. R. Islam and M. Ali, "Switched Parasitic Body-Worn Array for High Data Rate Wireless Applications,'' *IEEE Antennas and Wireless Propagation Letters*, vol. 11, pp. 693-696, 2012] we described the design and experimental results of a 2.45 GHz body wearable antenna array that was controlled using PIN diodes. It was demonstrated that for specific switch states the array beam could be steered in specific angular directions while improving antenna efficiency and reducing SAR (Specific Absorption Rate) over a conventional antenna at the same distance from the body.

In this work we will present the design and results (simulation and experimental) of a body wearable antenna array controlled using varactor diodes. The array consists of a number of parasitic dipoles that are controlled using silicon varactor diodes. The driven element is fed using a coaxial cable. The design guidelines and control variables will be presented as well as detailed simulation and experimental results. Arrays fabricated from conducting copper, conducting fabric, and conductive threads show excellent performance at around 900 MHz.